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ABSTRACT

The metacognitive aspects of reading include knowledge about and regulation of the mental processes involved. The knowledge component includes self-knowledge, which is awareness of personal strengths and weaknesses, and task-knowledge, which is awareness of the characteristics of the task and appropriate strategies for dealing with them. The regulation component refers to the functions of planning, monitoring, and revising. Recent interest in this area has spurred many investigations which use introspection or behavioral changes when text or purpose are controlled as indicators of knowledge or control of cognitive processes. There appears to be some confusion in recent literature as to whether metacognition is a new or old issue in reading education. A review of the literature supports the contention that the knowledge and skills referred to as metacognition have a rich history. These concepts have been investigated and advocated as necessary for effective comprehension throughout this century. Current researchers may gain insight into this area by looking into the past. (Fifty-eight references are attached.) (SR)

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The Roots of Metacognition:

An Historical Review

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The Roots of Metacognition: An Historical Review

In a chapter on extending literacy in Becoming a Nation of Readers: The Report of the Commission on Reading (1985), the issue of comprehension strategies is addressed. After a discussion of the need for direct instruction in the thinking and monitoring strategies that contribute to comprehension, the commission cites studies that verify that such instruction is not taking place in the schools and part of the reason is that teachers' manuals lack adequate information on how to proceed. Then they add:

> A manual isn't necessary for a teacher to teach in a fashion that "makes thinking public." However, the expectation that teachers can instruct students in these strategies without good manuals assumes that teachers have been trained to provide such instruction. Since most of the research underlying these strategies is relatively recent [italics added], this assumption is unrealistic (p.73-74).

It is true that the cognitive processes involved in reading and learning have emerged as a key topic for investigation during the 1970's. In 1976, A noted psychologist, Flavell, referred to the "active monitoring and consequent regulation and orchestration of these processes" (p.232) as metacognition. Numerous studies have focused on the learner's metacognitive awareness of mental processes and strategies used (e.g., Collins, Brown, & Larkin, 1980) and the efficacy of intervention training to promote the use of effective strategies (e.g., Brown, Campione, & Barclay, 1979).

However, in The Handbook of Reading Research (1984), Baker and Brown note that the knowledge and skills that fall under the rubric of metacognition have long been recognized. "Researchers since the turn of the century (e.g., Dewey, 1910; Huey, 1908/1968; Thorndike, 1917) have been aware that reading involves the planning, checking, and evaluating activities now regarded as metacognitive skills" (p. 354).

The apparent confusion in the literature as to whether metacognition is an old or new area of consideration warrants further investigation. In this paper, I intend to define the various components of metacognition as they are currently being described with respect to reading. And, using these parameters, to trace these notions back through the literature to the early part of the century to illustrate that they have long been under investigation and advocated as procedures conducive to efficient reading.

Metacognition Defined

According to Baker and Brown (1984) the term has been used in reference to two separate but somewhat interdependent phenomena: knowledge about cognition and regulation of cognition

The knowledge aspect of the concept refers to an individual's awareness of his or her own cognitive resources in relation to the task. Essentially, this means that the learner is aware of personal strengths

and weaknesses as well as the requirements of the learning situation. For adequate task knowledge, with tasks being determined by purpose for reading, the learner needs to be aware of the characteristics of various texts and of appropriate strategies for dealing with them. Effective strategy use requires procedural knowledge, i.e, how to perform the strategy, and what Paris, Lipson, and Wixson (1983) refer to as conditional knowledge, or knowing when and why the strategy is appropriate.

Regulation of cognition refers to the self-regulatory functions of planning, monitoring, and revising if breakdowns in comprehension or retention occur. Within the context of reading or studying, planning involves determining or accepting a purpose for reading, initial selection of appropriate strategies based on text characteristics and purpose, and such activities as previewing, self-questioning, predicting, hypothesizing, and activating prior knowledge.

Monitoring is crucial to the concept of metacognition and involves ongoing executive control of mental processes. Essentially, it consists of evaluating to determine if the selected strategies are working and whether or not comprehension is occurring. Monitoring involves activities such as summarizing and self-questioning.

The third aspect of regulation pertains to revision and involves strategies or actions that are activated only when needed. Specifically, the revision process involves modifying strategies if necessary, re-hypothesizing, making new predictions, rereading, and clarifying.

Basically, knowledge and regulation of cognition are difficult phenomena to observe or measure, particularly since, at least for efficient readers, these processes seemingly operate automatically just below the conscious level. Recent investigations into this area have relied on introspective self-reports, observable behavioral changes, or measurable achievement as indications of the existence of metacognitive ability, with the assumption that this ability has allowed for the changes. Specifically, with text or purpose controlled, dependent measures include level of comprehension achieved, attainment of purpose, adjustment of reading rate, or some other observable change in approach to the task.

With this description of the knowledge and skills involved in metacognition and the manner in which it has recently been investigated, let us look now into the past to determine how these issues developed, beginning with the knowledge aspect and concluding with the regulation of cognition.

Knowledge About Cognition in Reading

Research Investigations

Because of the validity problems inherent in studies involving introspection, the degree to which a person is aware of his or her cognitive processes is difficult to ascertain (Brown, 1980). For the

most part, knowledge is assumed to be the controlling force when behavior is changed because it is a prerequisite to regulation (Armbruster and Brown, 1984).

According to Cavanaugh and Perlmutter (1982), the question of what people know about their own thinking is an old issue in psychology.

> Early investigations of self-awareness of problem-solving strategies were conducted at Wurzburg (e.g., Ach, 1905), as well as in this country (e.g., Kuhlmann, 1907).
>
> Developmental investigation of this topic also began early, as exemplified by Binet's (1903) description of..."thought" reported by his daughter while solving problems, and Baldwin's (1909) introspective questionnaire study of sixth- to twelfth-grade children's knowledge about study strategies, self-testing, and study time (p. 11).

Other investigations involving introspection as a measure of knowledge were concerned with learners' study habits. When Yoakum (1925) asked children to explain what they do when they study, he found that they were conscious of a very limited number of study procedures. However, older, superior high school students were found to have developed conscious techniques of study which they varied and adapted to specific purposes in reading (Taylor, 1925). In a comparison of the study habits of good and poor readers, Mitzelfeld (1932) used a questionaire to determine that good readers have considerably more efficient methods of coping with problems such as dealing with unfamiliar words encountered in text.

In 1960, Shores attempted to determine differences in reading approaches through the analysis of written introspective reports. Following each reading, subjects were asked to explain how they thought they had read the material and how they thought an ideal reader would have read it. And soon after, Smith (1961) discovered through readers' self-reports that only one-half of the poorer readers could remember the assigned purpose immediately after reading.

Testimonials

Mortimer Adler's How To Read A Book (1940) contained references to the significance of task knowledge in reading. In his classic book on the art of reading, he suggests that readers must know what kind of book they are reading before they begin because different types of books require different types of thinking. He recommends using the title, table of contents, preface, etc. as means of determining the type of book. This is consistent with the notion that readers should be aware of text characteristics and possess procedural and conditional knowledge of appropriate strategies for dealing with them.

Regulation of Cognition in Reading

The investigations into and the testimonials for regulation of thought processes in reading are far more numerous than those of the knowledge aspect, presumably because measures of regulation are somewhat more attainable and perhaps the fact that regulatory actions presuppose the existence of

knowledge. Early research and discussions did not focus on the idea of deliberate, conscious regulation but rather on the fact that regulation was necessary as was being used by efficient readers.

Research Investigations

Many studies throughout the years have investigated the hypothesis that material of different type or difficulty or various purposes for reading invoke different treatments or approaches on the part of the efficient reader. As Rankin (1974) pointed out, mere changes in reading behavior from one point in time to another do not represent deliberate control of mental processes. The independent variables of text and purpose must be present to determine such regulation.

Text type. Several studies investigated the effect of text type. For example, McKee (1926) and Snyder (1929) both compared the effects on comprehension and retention of material presented in expository form versus narrative form, but with conflicting results. McKee found differences in favor of expository form, whereas Snyder found no differences other than decided personal preferences. The effects of well-written versus poorly-written material were investigated by Fishback (1925) with the not surprising results that considerate text favors improved comprehension. The realization that adjustments in reading approaches must be made to fit the task was determined by McCallister (1932). He reported the results of analyses of the materials and techniques of teaching various content subjects. The results of another study indicated that various text types influence the mental activities of readers as measured by varied eye movements patterns (Stone, 1941).

Text difficulty. Text difficulty as an independent variable was studied by Judd and Buswell (1922) and Anderson (1937) using eye movements as the observable change in behavior. Studies conducted by Anderson indicated that the complexity of text influences the eye movements of good and poor readers, with good readers demonstrating more flexibility in adjusting to increasingly difficulty material. Parenthetically, I might add here that Anderson offered some insight into the significance of eye movement research for metacognition when he explained that poor readers tend to read all materials with the same mental set, making no adjustments. He furthered explained that while there is no representation in consciousness of the motor adjustments of eye movements, they are dictated by conscious mental processes and are innervated subsequent to the initial conscious orientation made by the reader to the conditions of the situation.

Tinker (1939) also varied the difficulty level of text in his study of the correlation between rate and comprehension. He found that as the materials make increasing demands on the reader the correlation between rate and comprehension decreases, indicating that adjustments are being made.

Purposes/Tasks. Numerous studies addressed the effects that purposes for reading had on comprehension. Again, eye movements were used as indications of adaptive behavior. For example, C.T. Gray (1917) compared the eye movement patterns of adults who read for different purposes, either to answer questions or to reproduce the material. He found increased number of pauses and regressions in the people who were reading to answer questions. Walker's 1938

study indicated that most deviations from normal movements occurred under changes in purposes for reading and Simpson (1942) secured the superiority of eye movements in reading habits of good readers and demonstrated that the purpose for which people read has much to do with the character of the eye movement habits.

Kimmel (1925), who compared the purpose of being told to read fast to that of being asked to reproduce the material, thereby causing the subjects to focus on efficiency, found that the reproduction group gained in overall comprehension. In 1927, Distad used recall as a measure to determine the effects of reading for specific purposes compared to undirected reading and found that reading for specific purposes resulted in increased recall.

Henderson's 1963 study investigated the correlation between ability to set purposes for reading and the attainment of purposes as well as general reading ability and ability to set purposes. In both cases, he found the correlations to be high, indicating the superiority of good readers in metacognitive abilities. Sisson (1939) and Shores and Husbands (1950) both provided evidence that good readers adjust their rate according to purposes for reading.

Intervention studies. A review of the early literature also revealed studies of intervention training involving the types of skills generally considered to be utilized in the planning and monitoring stages of metacognition. They bear considerable resemblance to current studies in this area (e.g., Capelli & Markman, 1981; Doctorow, Wittrock, & Marks, 1978; Palinscar & Brown, 1983; Singer & Donlan, 1982). Several experiments resulted in increased organizational skills such as summarizing and outlining (Newlun, 1930; Salisbury, 1934; Simpson, 1929) and two others suggested that such skills were of more benefit to lower achieving students, presumably because better students were already proficient in these skills (Alderman, 1926; Jacobson, 1932). A significant study conducted by Inga Helsuth in 1926 reports the effects of having students generate their own questions in history lessons and to answer them in accordance to plans worked out independently. Studies of progress indicated that the students gained remarkably in ability to locate and introduce problems, to solve problems, and in conscious attention to their own methods and work habits.

Error analysis. Another pertinent area of investigation involved the analysis of oral reading errors. This line of research lends credence to the notion that good readers monitor their comprehension as they read. For example, in analyzing oral reading errors of good and poor readers, Swanson (1937) found that the errors of good readers usually did not alter the meaning of the selection, whereas poor readers' errors tended to change the meaning significantly. He also pointed out that good readers always achieved correction when they repeated a segment of text while poor readers did not.

Reading As Reflection/Thinking

Apart from all of the empirical studies, though, there was much written about the psychological nature of reading as a thinking process, not unregulated thinking but rather the deliberate, controlled reflective thought that Dewey speaks of in How We Think (1910). That is, the type of thinking that is consistent with the notion that as one reads, he or she is involved in

active monitoring, evaluating, and efforts towards reaching a solution to a problem, i.e., comprehension. About this Dewey says:

> Reflective thought is purposeful. It goes in steps with each being utilized in the next. It leads to a conclusion (p. 5).
>
> Reflective thought includes a conscious and voluntary effort to establish belief upon evidence and rationality (p. 9).
>
> Partial conclusions emerge during the course of reflection. There are temporary stopping places, landings of past thought that are also stations of departure for subsequent thought....At every such landing stage it is useful to retrace the processes gone through and to state to oneself how much and how little of the material previously thought about really bears on the conclusion reached and how it bears (p. 75).
>
> The function of reflective thought is, therefore, to transform a situation in which there is experienced obscurity, doubt, conflict,...into a situation that is clear, coherent, settled, harmonious (p. 100-101).

Other writers have emphasized the controlled thinking aspect of reading. Thorndike (1917) said that reading "involves the same sort of organization and analytic action of ideas as occur in thinking of supposedly higher sorts" (p. 330). Reading, he explained, should not be considered as a mechanical, passive, undiscriminating task which is on a different level than thinking processes. It involves "elaborate and inventive organization and control of mental connections..." (p. 332). Adler (1940) emphasizes that reading is certainly not a passive affair. "There is no art of thinking apart from the art of reading. To whatever extent it is true that reading is learning, it is also true that reading is thinking" (p. 43). In a review of the literature, Husbands and Shores (1950) concluded that the reading process as it was then being defined could not be clearly differentiated from thinking.

Testimonials

And finally, much has been written before this most recent trend toward metacognitive awareness about how "mature", "efficient", "flexible", "versatile" readers do and should regulate and monitor their own reading comprehension and that less proficient readers apparently lack this awareness. Early indications of these caveats appeared in Huey's classic book on the psychology and pedagogy of reading (1908/1968). Advocating the value of practice in reading for meaning as a means of developing an "effective" rate of reading, Huey stressed the importance of adjusting rates to purposes and of reading with selective discrimination according to the purposes:

> And such practice will also develop discriminative reading, and will develop the power to discriminate and to

> grasp the essential. Pages that are full of meaning, or that carry meanings for which the reader's apperception is not well prepared, will be given the time that they require. But many a page has almost nothing that the reader wants, or only suggests what he is already familiar with. There is simply no sense in reading such matter carefully at the regulation pace (p. 360).
>
> If the mind really keeps positively exercising itself and feeding on what may be found worth using, it may deal safely with almost any quantity of any material. But the reader who lets the machinery of reading automatically run through with any and all grists will be found growing to a likeness that is without character (p. 363).

Huey also admonishes that very little training is given in how to read discriminatively and that even high school and college students are "unable to make effective abstracts or to grasp quickly the gist of what is read"...(p.364).

In a Psychological Monograph, Anderson (1937) discussed the significant correlation between rate and comprehension and the implication that adjustments in rate are controlled by the central thought processes. "Comprehension and rate do not exist independently; rather, rate is the necessary outcome of time-consuming processes in reading. Reading rate will vary as the result of variations in the comprehension functions. An alteration in rate which is not adjusted to difficulty or purpose will disturb the normal course of thought processes involved" (p. 29).

The various definitions of reading flexibility reported by Rankin (1974) all address the issue of regulation of reading processes with respect to text type and difficulty, and tasks. Carillo and Sheldon (1952) describe the mature reader as one who is adaptable and versatile; one who adapts his rate of reading to his or her purpose for reading and to the difficulty level of the material while maintaining an adequate level of comprehension. McDonald (1965) emphasized the adjustment of reading approaches, i.e., perceptual and cognitive processes, skills, study techniques, etc., as being necessary to understand text as dictated by reader's purpose. And finally, Berg (1967) said that flexibility "refers to the activity a reader is engaged in when he sets up various patterns of thinking relative to his reading needs and then selects the skills that best accomplish this purpose" (p. 45).

The National Society for the Study of Education has long been an influential source in determining trends in reading education. Prior to the 1920's the Yearbook committee had advocated the objectives of reading instruction to be: "to master the mechanics of reading, to develop habits of good oral reading, and to stimulate keen interest in, and appreciation of, good literature" (Gray, 1925, p. 9). In the 24th Yearbook (1925), Gray addresses the "newer" issue of effective, efficient reading as being an important objective in reading instruction:

> An analysis of the characteristics of an effective reader shows that he follows appropriate steps in each reading situation, assumes desirable attitudes, and makes use of economical and effective habits and skills. A third aim of reading instruction, therefore, is to develop the attitudes, habits, and skills that are essential in the various types of reading activities in which children and adults should engage (p. 12).
>
> It is essential, therefore, that instruction provide training in reading numerous types of material for various purposes until appropriate habits and reading procedures have been successfully established (p. 15).

Two other significant contributions to the literature on the regulation of cognition in reading are Stauffer's version of the Directed Reading-Thinking Activity (1969) and Robinson's SQ3R study technique (1941).

Although much was written about the efficacy of regulating thought processes during reading, a few authors have noted the fact that not only do many readers fail to monitor their comprehension, but many do not even realize when they have not understood something. Thorndike (1917) said:

> It appears likely...that a pupil may read fluently and feel that the series of words are arousing appropriate thoughts without really understanding the paragraph. Many of the children who made notable mistakes [on the paragraph in his experiment] would probably have said that they understood the paragraph and, upon reading the questions on it, would have said that they understood them. In such cases the reader finds satisfying solutions of those problems which he does raise and so feels mentally adequate; but he raises only a few of the problems which should be raised and makes only a few of the judgements which he should make (p. 332).

Piaget (1926) noted the failure of nine to eleven year olds to realize their lack of comprehension. In a attempt to standardize a test of understanding, he and his colleagues at the Institut Rousseau asked subjects to match a proverb with a sentence that had the same meaning. In the majority of cases the children did not understand the proverbs in the least; but they thought they had and asked for no supplementary explanation of their literal or hidden meanings.

Adler (1940) says that when people read, they either understand or they don't. If they understand enough to know that they don't understand it at all, they can do something about it. He notes, however, that many people don't know when they haven't understood and therefore, cannot correct the situation.

Summary and Conclusions

The metacognitive aspects of reading include knowledge about and regulation of the mental processes involved. The knowledge component includes self-knowledge, which is awareness of personal strengths and weaknesses, and task-knowledge, which is awareness of the characteristics of the task and appropriate strategies for dealing with them. The regulation component refers to the functions of planning, monitoring, and revising.

Recent interest in this area has spurred many investigations which use introspection or behavioral changes when text or purpose are controlled as indicators of knowledge or control of cognitive processes. There appears to be some confusion in recent literature as to whether metacognition is a new or old issue in reading education. A review of the literature as presented in this paper supports the contention that the knowledge and skills referred to as metacognition have a rich history. These concepts have been investigated and advocated as necessary for effective comprehension throughout this century. Current researchers may gain insight into this area by looking into the past.

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